MOTOR VEHICLE SEAT

BACKGROUND AND SUMMARY OF THE INVENTION

This application is a National Phase of PCT/EP2004/012003, filed October 23, 2004 and claims priority of German patent document DE 103 50 146.0, filed October 28, 2003.

The present invention relates to a motor vehicle seat.

A cushion with a cushion core is described in German patent application number 102 43 315.16 filed 09.18.2002, which has still not been published by the effective application date of the present patent application. To improve the climate comfort, longitudinal and transverse grooves are formed in a surface of the cushion core, and are spaced apart from one another. The grooves have a constant cross section, are open toward a cover layer and intersect one another. In this cushion, the longitudinal and transverse grooves are ventilation ducts. In addition, ventilation channels which penetrate the full core thickness of the cushion core open, on one hand, in the intersecting points of longitudinal and transverse grooves and, on the other hand, freely on the outside of the cushion core. Furthermore, a fan for subjecting a central cushion region to air can be arranged either on that side of the cushion core which faces away from the cover layer and at a distance therefrom, or in a channel completely penetrating the cushion core.

DE 200 02 447 U1 discloses a seat cushion for vehicle seats, in particular for vehicle seats with a core part made from plastic foam. On its upper side facing a seat surface, the core part has duct-like depressions which cause zonal weakening and thereby configure the seat surface in accordance with the required pressure

ratios. The basic concept in this case is to provide a support which is suitable for the body and at the same time brings about a soft and pleasant sitting sensation. The duct-like depressions and those remaining partial surfaces of the core part which are formed thereby are adapted to the human anatomy in such a manner that an optimum seat pressure distribution is achieved. It is furthermore provided to permit, at least partially, a circulation of air in the duct-like depressions. Either a passive or an active ventilation can be provided with an additional ventilator.

DE 33 06 871 A1 discloses a cushion with an air-permeable cover layer. In this known cushion, ventilation ducts or flexible tubes running on or in the core and having air-permeable walls bring about a reinforced exchange of air in the regions on which the person is sitting, leaning or reclining, which prevents too great a rise in temperature of the cushion surface. Furthermore, the duct density and a duct cross section are coordinated to a cushion size or cushion shape such that a seat pressure distribution perceived as being comfortable is maintained.

DE 40 01 207 A1 discloses a vehicle seat with a cushion body provided with a cushion cover. On the inside of the seat, a moisture-absorbing material is provided between cushion body and a cushion cover to absorb the moisture on the contact surfaces of the seat, against which the body parts of the vehicle occupant bear, and transporting it to the outside of the seat. Furthermore, recesses in the form of blind-pore-like transverse grooves are provided in the cushion body and the moisture-absorbing material extends through them to the outside of the cushion body. The abovementioned recesses transport away the moisture which arises and therefore ensures a pleasant seat climate. In this

case, the abovementioned recesses are distributed essentially regularly and uniformly over the seat surface or backrest surface of the vehicle seat.

An object of the present invention is to provide an improved vehicle seat, in which, in particular, a particularly high seat comfort is achieved.

This object has been achieved by providing a predetermined arrangement of at least one of the ventilation ducts and the ventilation channels in the cushion core defines regions ventilated to different extents adapted to a ventilation requirement of a standard vehicle occupant.

More specifically, the present invention is based on the recognition, in a motor vehicle seat which has a cushion core with essentially surface-parallel ventilation ducts and ventilation channels arranged transversely thereto, of providing a predetermined arrangement of the ventilation ducts and/or ventilation channels which defines regions in the cushion core which are ventilated to different extents. These regions are adapted to a ventilation requirement of a standard vehicle occupant.

The ventilation ducts run essentially along and inside a seat surface and/or backrest surface and have an essentially constant cross section. The ventilation channels, which likewise in each case have a constant cross section, penetrate the entire thickness of the cushion core and extend from the ventilation ducts as far as a rear wall facing away from the seat surface and/or backrest surface. In this case, the ventilation channels preferably open in an intersecting point of two intersecting ventilation ducts.

The invention affords the great advantage that the ventilation ducts are only arranged within the cushion core at the points at which a ventilation is actually required. For example, there is an increased ventilation requirement in the lower back region or in the region of a human ischial protuberance whereas, in the shoulder region, i.e. in the upper back region, there is a rather low ventilation requirement.

By adapting the ventilation system comprising ventilation ducts and ventilation channels to the ventilation requirement of a standardized vehicle occupant, a significant increase in comfort is achieved. This comfort makes itself noticeable in particular by the fact that the sweat moisture which is output by the vehicle occupant and is output to different extents at different points of the vehicle seat can be removed as required. A pleasant and fresh seat feel is thereby imparted to the vehicle occupant, which has a positive effect on the vehicle occupant's feeling of well-being and consequently also on the driving safety.

In regions with a greater ventilation requirement, the ventilation ducts and/or the ventilation channels can be arranged more densely and/or can have a larger cross section and can thereby bring about an increased dehumidifying capacity. In regions in which only a moderate or low sweat moisture occurrence is to be expected, the ventilation ducts and/or ventilation channels can be at a larger distance from one another and/or can be formed with a smaller cross-section. Overall, the solution according to the invention therefore affords the great advantage that the ventilation capacity of the vehicle seat is adapted to the actual ventilation requirement of different seat points.

According to a preferred embodiment of the invention, the ventilation requirement is adapted to a body pressure distribution. At points with increased body pressure, for example in the region of the human ischial protuberance, an increased sweat moisture occurrence is to be expected whereas, in regions with a low body contact pressure, of course, significantly less sweat moisture occurs. As a result, the ventilation requirement is expediently adapted to a body pressure distribution by, for example, the arrangement of the ventilation ducts and/or the ventilation channels being coordinated with regard to their shape and arrangement density to the body pressure distribution. As a result, the ventilation or the removal of moisture is coordinated as required to the actual requirement, triggered by the human anatomy.

According to an advantageous development of the invention, the ventilation requirement is adapted to body contact points. In this embodiment too, a dehumidification of individual seat regions which meets requirements and, above all, is adapted to the human anatomy is ensured. At points at which the standard vehicle occupant's body has contact with the seat surface or backrest surface, a significantly higher sweat moisture occurrence is normally to be expected than at points at which no or only sporadic contact between the vehicle occupant and the seat surface or backrest surface occurs.

At regions at which the vehicle occupant does not have any contact with the seat surface or back rest surface, between the latter and the vehicle occupant there is an insulating, dehumidifying and simultaneously freshening air layer which, even when there is a low flow rate, guarantees sufficient ventilation. By contrast,

however, at regions with direct body contact the thickness of this air layer is greatly reduced, and a flow rate or circulation of the air layer is virtually impossible. It therefore appears extremely expedient to adapt the ventilation requirement, i.e. the arrangement of the ventilation ducts and/or ventilation channels, to possible body contact points of the standard vehicle occupant with the vehicle seat.

The ventilation ducts can be expediently designed as a duct grid and to intersect them in a manner connected in terms of flow. A duct grid of this type provides uniform and sufficient ventilation of all of the connected ducts, and thereby ensures a circulation, which is required for the ventilation, in the duct system.

According to a particularly preferred embodiment of the solution according to the invention, the ventilation ducts and/or ventilation channels can only be arranged in regions with ventilation provided. Regions of this type can be defined, for example, via the seat pressure distribution or via the body contact points and can thereby ensure that the ventilation of the cushion core and therefore of the vehicle seat is essentially restricted to the regions in which there is an actual ventilation requirement.

According to a preferred development of the invention, the ventilation ducts and/or the ventilation channels can be closed in regions in which no ventilation is provided. This affords the great advantage that, in the first instance, a standardized cushion core is used, in which the corresponding ventilation ducts and/or ventilation channels are closed, for example, by an adhesive bond or by a stopper during production subsequently. Thereby, for example, a reduction in

components and therefore an advantage in terms of costs can be achieved.

According to a particularly preferred embodiment, the vehicle seat is a passively ventilated vehicle seat in which the pumping action caused by the movement of the vehicle occupant during the journey is essentially sufficient in order to bring about a sufficient circulation of the air in the ventilation ducts and/or ventilation channels. In contrast to an actively ventilated vehicle seat, an additional ventilator can therefore be saved and, as a result, the significant lowering of costs can be achieved.

It is also contemplated for the vehicle seat to be an actively ventilated vehicle seat, with at least one fan or a miniature ventilator being provided to ventilate the vehicle seat. In comparison to the passively ventilated vehicle seat, this embodiment ensures a significantly increased dehumidifying capacity, so that, in particular in the summer months, an active seat ventilation can achieve an additional increase in comfort. It is also contemplated in this case that, when the fan or the miniature ventilator is switched off, the vehicle seat which up to now was actively ventilated is passively ventilated.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

Fig. 1 is a plan view of a vehicle seat according to the invention,

Fig. 2 is a schematic illustration of a body pressure distribution of a standard vehicle occupant on a vehicle seat, and

Fig. 3 is a view similar to Fig. 1, but with differently arranged ventilation ducts.

DETAILED DESCRIPTION OF THE DRAWINGS

Fig. 1[,]] shows a part of a vehicle seat 1, namely a seat surface 2 which has a multiplicity of intersecting ventilation ducts 3 . Both in Fig. 1 and in Fig. 2, only the seat surface 2 of the vehicle seat 1 is illustrated, it being understood that the details described below are also transferable to a backrest surface of the vehicle seat 1.

The ventilation ducts 3 are arranged both in the longitudinal direction of the seat and in the transverse direction of the seat and intersect at points 9 at which a respective ventilation channel 5 arranged transversely to the ventilation ducts 3 opens. The ventilation ducts 3 run along and on the inside of a seat surface 2 or a backrest surface (not illustrated) within the cushion core 4 and each have an essentially constant cross section. The ventilation channels 5 penetrate the entire thickness of the cushion core 4 and extend from the ventilation ducts 3 on the one hand, as far as a rear wall (not illustrated) which faces away from the seat surface 2, each of the channels 5 having a constant cross-section.

According to Figs. 1 and 3, the ventilation ducts 3 and the ventilation channels 5 are arranged regularly, i.e. essentially symmetrically to a central vertical plane

of the vehicle seat 1. A solid line here indicates a ventilation duct 3 or a ventilation channel 5 through which the flow passes to ventilate the vehicle seat 1, whereas ventilation ducts 3 or ventilation channels 5 shown by dashed lines, i.e. shown by a broken line, are either not provided or else are closed.

According to the invention, a certain or specific arrangement of the ventilation ducts 3 and/or ventilation channels 5, i.e., for example, a layer, a density (number per unit of area) and/or a cross section, defines regions 6 in the cushion core which are ventilated to different extents and are adapted to a ventilation requirement of a standard vehicle occupant (not illustrated). That is, a strength of the ventilation of the vehicle seat 1 is adapted to standardized anatomy data of the human body. Such an adaptation of the ventilation requirement can be undertaken, for example, with reference to a body pressure distribution 7 (compare Fig. 2). A body pressure distribution of this type separates seat regions 6', in which a ventilation is required, and seat regions 6", in which only a low ventilation, if any at all, is required. In addition, of course, a further refinement of the regions 6' into further regions (not illustrated) which are ventilated to different extents is possible within the scope of the invention. A further subdivision into more refined regions can take place, for example, according to Fig. 2, with reference to a color card or grayscale card generated by the body pressure distribution 7.

According to Fig. 1 and Fig. 3, the ventilation ducts 3 and the ventilation channels 5 are not arranged or are closed in the regions 6", in which no ventilation is required.

In regions 6' in which a significantly greater ventilation is required in order to remove sweat moisture, the ventilation ducts 3 and the ventilation channels 5 can have, for example, a larger cross section and/or a denser arrangement. By contrast, in regions 6', in which a lower ventilation is required, the ventilation ducts 3 and the ventilation channels 4 can have a smaller cross section or a position further away from one another.

The seat pressure distribution 7 according to Fig. 2 corresponds, for example, to an average seat pressure distribution (e.g. 95 % percentile) and, as a result, is anatomically suitable for a great majority of the vehicle occupants. The adaptation of the cross section of the ventilation channels 5 and of the ventilation ducts 3 and the density of the position of the same can take place proportionally to a color scale of the seat pressure distribution 7.

In addition it is contemplated that the vehicle seat 1 is a passively ventilation vehicle seat 1, in which a ventilation of the cushion core 4 is brought about only by convective flow or by a movement of the vehicle occupant on the vehicle seat 1 during the journey. By contrast, however, the vehicle seat 1 can be an actively ventilated vehicle seat 1 with at least one fan or a miniature ventilator (not illustrated) being provided. An actively ventilated vehicle seat 1 provides the advantage of being able to ensure an increased dehumidifying capacity and, as a result, of also being able to reliably remove increased amounts of sweat moisture which arises. A combination of actively and passively ventilated vehicle seat 1 is also contemplated, in which case, after the fan is switched off, the actively ventilated vehicle seat 1 is

automatically transferred into a passively ventilated vehicle seat 1, and vice versa.

According to Fig. 1 and Fig. 3, the ventilation ducts 3 and the ventilation channels 5 run essentially regularly, with, in addition[[,]] or alternatively, [[a]] symmetric or irregularly arranged ventilation ducts 3 and ventilation channels 5 also being contemplated.

In summary, essential features of the invention can be characterized as follows:

In the case of a vehicle seat 1 with a cushion core 4, in which ventilation ducts 3 and ventilation channels 5 in each case having a constant cross section run, for regions 6 which are ventilated to different extents to be defined by a predetermined arrangement of the ventilation ducts 3 and/or the ventilation channels 5. The regions 6 defined in such a manner are adapted to a ventilation requirement of a standard vehicle occupant, for example with reference to a body pressure distribution 7 or with reference to body contact points.

The ventilation ducts 3 run along and on the inside of the cushion core 4 or a seat surface 2 and/or a backrest surface, with the ventilation channels 5, which in each case have a constant cross section and penetrate the entire thickness of the cushion core 4, running essentially transversely thereto.

The invention~~,~~ achieves a required ventilation of individual regions 6, 6′, 6″ of the seat surface 2 and/or on the backrest surface of the vehicle seat 1. As a result, a ventilation capacity is adapted to the particular requirements, for example a sweat moisture

occurrence. Thereby, the sweat moisture which occurs and can be reliably removed a comfortable seat sensation is impacted to the vehicle occupant.

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